

Solubility RULES!

Easier Version

Insoluble products in double replacement reactions form precipitates.

Solubility Rules	
	Soluble = dissolves
	Insoluble = does not dissolve
1	All compounds containing alkali metal cations (Li^+ , Na^+ , K^+ , Rb^+ , Cs^+) and the ammonium ion (NH_4^+) are soluble.
2	All compounds containing NO_3^- , ClO_4^- , ClO_3^- , and $\text{C}_2\text{H}_3\text{O}_2^-$ anions are soluble.
3	All chlorides (Cl^-), bromides (Br^-), and iodides (I^-) are soluble except those containing Ag^+ , Pb^{+2} , or Hg_2^{+2} .
4	All sulfates (SO_4^{-2}) are soluble except those containing Hg_2^{+2} , Pb^{+2} , Sr^{+2} , Ca^{+2} , or Ba^{+2} .
5	All hydroxides (OH^-) are insoluble except compounds of the alkali metals, NH_4^+ , Ca^{+2} , Sr^{+2} , and Ba^{+2} .
6	All compounds containing PO_4^{-3} , S^{-2} , CO_3^{-2} , and SO_3^{-2} ions are insoluble except those that also contain alkali metals or NH_4^+ .

In-Depth Version

- 1) Salts containing Group I elements are soluble (Li^+ , Na^+ , K^+ , Cs^+ , Rb^+). Salts containing the ammonium ion (NH_4^+) are also soluble.
- 2) Salts containing nitrate ion (NO_3^-) are generally soluble. Salts containing acetate ion ($\text{C}_2\text{H}_3\text{O}_2^-$) are also soluble.
- 3) Salts containing Cl^- , Br^- , I^- are generally soluble. Important exceptions to this rule are halide salts of Ag^+ , Pb^{2+} , and Hg_2^{2+} . Thus, AgCl , PbBr_2 , and Hg_2Cl_2 are all insoluble.
- 4) Most sulfate (SO_4^{-2}) salts are soluble. Important exceptions to this rule include BaSO_4 , PbSO_4 , Ag_2SO_4 and SrSO_4 .
- 5) Most hydroxide (OH^-) salts are only slightly soluble. Hydroxide salts of Group I elements are soluble. Hydroxide salts of Group II elements (Ca, Sr, and Ba) are soluble. Hydroxide salts of transition metals and Al^{3+} are insoluble.
- 6) Most sulfides (S^{-2}) are highly insoluble.
- 7) Carbonates (CO_3^{-2}) are frequently insoluble.
- 8) Chromates (CrO_4^{-2}) are frequently insoluble. Examples: PbCrO_4 , BaCrO_4
- 9) Phosphates (PO_4^{-3}) are frequently insoluble. Examples: $\text{Ca}_3(\text{PO}_4)_2$, Ag_3PO_4
- 10) Fluorides (F^-) are frequently insoluble. Examples: BaF_2 , MgF_2 , PbF_2 .